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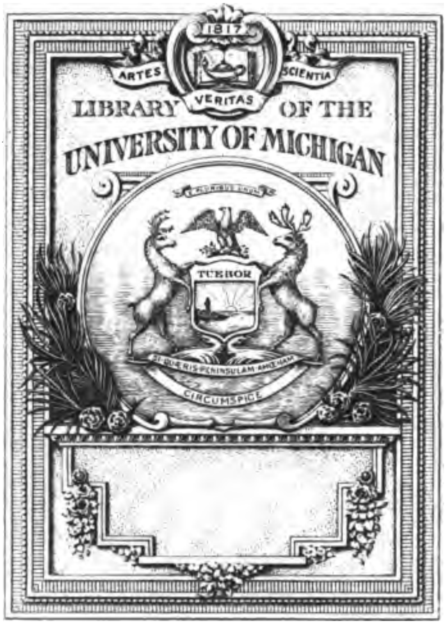

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EXPERIMENTS
AND
OBSERVATIONS
TENDING TO ILLUSTRATE THE
NATURE
AND
PROPERTIES
OF
ELECTRICITY.

In one LETTER to *Martin Folkes*, Eſq; Preſident, and Two to the *Royal Society*.

By *WILLIAM WATSON*, F.R.S.

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THE PREFACE.

THE following Sheets were not intended to be made publick, but as part of the Philoſophical Tranſactions. As thoſe Works are printed in the order of Time they are read; theſe Obſervations, communicated to the ROYAL SOCIETY *at different Meetings, would, upon that Account, have been publiſh'd ſeparate in different Numbers of thoſe Tranſactions. To ſatisfy therefore the Impatience of ſeveral learned and very valuable Friends, to whoſe Importunities I have neither Will, nor Inclination to deny any thing in my Power to grant, I cauſed a few Copies to be print-*

ed, that the whole might be ſeen together, and then broke up the Preſs. This has excited the Curioſity of the Publick, and raiſed a Demand for theſe Experiments much beyond what I had reaſon to expect. I therefore found it neceſſary to ſend them to the Preſs a ſecond Time, leſt ſome of thoſe over-officious Gentlemen, who are always ready on theſe Occaſions, ſhould do it for me; ſo that whoever has an Inclination, may now be made acquainted, by what Means the ſeveral ſurprizing Phænomena of Electricity have been brought about.

I choſe to lay theſe Papers before the Publick in the ſame Dreſs wherein they appeared before the very honourable and learned Body, to whom, as the various Effects of Electricity preſented themſelves, they were regularly communicated, and from whom they met with a very favourable Reception. Many Members of the ROYAL SOCIETY, *as well as ſeveral other Perſons of great Rank*

Rank and Quality, have been repeated Witneſſes of the Facts which are here laid before the World; particularly the preſent worthy Preſident, Martin Folkes, Eſq; *whoſe extenſive Abilities and great Knowledge in every Branch of uſeful Literature are exceeded only by his Candour and Zeal in promoting Science. The Advice and Aſſiſtance of this Gentleman, whoſe Friendſhip I ſhall always eſteem as one of the greateſt Happineſſes of my Life, has been of great Moment in the Proſecution of theſe Diſcoveries. I therefore take this publick Manner of teſtifying my ſincereſt Obligations as well to him, as to Sir* Hans Sloane, Bart. *who, although retired from Buſineſs, is nevertheleſs attentive to whatever tends to the Advancement of Philoſophy. Upon a Report made to him of theſe Experiments and Obſervations, he, as ſurviving Executor of Sir* Godfrey Copley, *was pleaſed to appoint me laſt Year to receive the annual*

nual Prize-medal of Gold, given by the ROYAL SOCIETY *in conſequence of Sir* GODFREY'S *Benefaction. The Honour of being ſo particularly taken notice of by Gentlemen of ſuch diſtinguiſhed Merit, as it cannot but give me the higheſt Pleaſure, ſo ſhall it ever continue to raiſe in me Sentiments of the trueſt Gratitude, and moſt profound Reſpect.*

IF it ſhould be aſked, to what uſeful Purpoſes the Effects of Electricity can be applied, it may be anſwered, that we are not as yet ſo far advanced in theſe Diſcoveries as to render them conducive to the Service of Mankind. Perfection in any Branch of Philoſophy is to be attained but by ſlow Gradations. It is our Duty to be ſtill going forward; the reſt we muſt leave to the Direction of that Providence, which we know aſſuredly, has created nothing in vain. But I make no Scruple to aſſert, that notwithſtanding the great Advances, which have been made in this *part of natural Philoſophy within theſe few Years, many and great Properties remain ſtill undiſcover'd. Future Philoſophers (ſome perhaps even of the preſent Age) may deduce from electrical Experiments, Uſes extremely beneficial to Society in general.*

NO preſent Advantage accrued to thoſe Perſons, or to that Age, which firſt diſcover'd the Properties of the Magnet. Many hundreds of Years intervened, before they were applied to the great Uſes of Navigation. Had theſe remain'd a ſecret till now, what other Methods could have been ſubſtituted in their Place, by which we could ſecurely traverſe the vaſt Ocean? All the Advantages we receive from diſtant Commerce, we muſt ſtill have been Strangers to, but for this fortunate Application of the magnetical Power. And even the Diſcoveries thus far had been very imperfect, without the Knowledge of the Variation of the Compaſs. But the preſent

ſent Age, and even this Nation, boaſts of a Gentleman, who ſeems to be entruſted with the magnetical Powers themſelves. He makes artificial Magnets, increaſes in a few Minutes the Powers of real ones to a ſurprizing Degree, changes at Pleaſure their Poles, and makes that newly acquired Polarity, permanent. The World, I hope, will not long be deprived of the Manner, by which theſe extraordinary Changes are produced, which as yet this Gentleman thinks proper to conceal. As Electricity has ſome Properties in common with Magnetiſm, as will be ſhewn in the Courſe of theſe Obſervations; ſome new Lights probably may be thrown upon both. But to return; admitting even, that no ſubſtantial Advantages could ariſe from the Inquiries before us, (which, however, we can by no means grant, upon our conſidering the Effects we already perceive of its Operations upon human Bodies) whatever*

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* Dr. *Gowin Knight*, F. R. S.

tends to enlarge the Conceptions of the Mind, and to implant in us ſtill more lofty Ideas of the Almighty Author of Nature, deſerves certainly, independent of other Conſiderations, our higheſt Regard.

THESE Experiments were all made with Glaſs Tubes of about two Foot long; the bore about an Inch in Diameter. But a ſcrupulous Exactneſs in theſe Proportions is no ways neceſſary. The thinner and lighter theſe Tubes are, the ſooner they are excited; though they, 'tis true, don't retain their Power ſo long as thoſe, which are more thick and ſubſtantial. But where you intend to communicate the electrical Power, as faſt as you excite it, I ſhould prefer a light Tube; though it ought never to be leſs than $\frac{1}{12}$ of an Inch thick, becauſe of the Danger of breaking it by the Friction.

THE Tube, before it is rubbed, ſhould be always made dry and warm, which may be done by laying it before *the Fire. But I cannot omit hereupon making one further Remark*; viz. *that Glaſs Tubes, exactly of the ſame Dimenſions, made at the ſame Time, and with the ſame Materials, vary conſiderably with regard to their fitneſs for electrical Purpoſes. Clear and dry Air with ſome degree of cold is moſt eligible, though I have ſucceeded in the greateſt Fogs, but with more Difficulty.*

TO

TO

Martin Folkes, Eſq;

P. R. S.

SIR,

THE Society having heard from ſome of their Correſpondents in *Germany*, that what they call a Vegetable Quinteſſence had been fired by Electricity, I take this Opportunity to acquaint you, that on *Friday* Evening laſt I ſucceeded, after having been diſappointed in many Attempts, in ſetting Spirits of Wine on Fire by that Power. The preceding Part of the Week had been remarkably warm, and the Air very dry, than which nothing is more neceſſary towards the Succeſs of Electrical Trials; to theſe I may add, that the Wind was then Eaſterly and inclining to freeze. I that Evening uſed a glaſs Sphere as well as a Tube; but I always find myſelf capable of ſending forth much more Fire from the Tube than from the Sphere, probably from not being ſufficiently uſed to the laſt.

I HAD before obſerv'd, that although * Non-electric Bodies made electrical, loſe almoſt all that Electricity by coming either within or

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* I call *Electrics per ſe* or originally-*electrics*, thoſe Bodies, in which an attractive Power towards light Subſtances is eaſily excited by Friction; ſuch as Glaſs, Amber, Sulphur, Sealing-wax, and moſt dry Parts of Animals, as Silk, Hair, and ſuch like. I call *Non-electrics* or Conductors of Electricity, thoſe Bodies, in which the above Property is not at all or very ſlightly perceptible; ſuch as Wood, Animals living or dead, Metals and vegetable Subſtances. See *Gray*, *Du Fay*, *Deſaguliers*, *Wheler*, in the Philoſophical Tranſactions.

or near the Contract of *Non-electrics* not made electrical; it happens otherwiſe with Regard to *Electrics per ſe*, when excited by rubbing, patting, *&c*; becauſe from the rubbed Tube I can ſometimes procure five or ſix Flaſhes from different Parts, as though the Tube of two Foot long, inſtead of being one continued Cylinder, conſiſted of five or ſix ſeparate Segments of Cylinders, each of which gave out its Electricity at a different Exploſion.

THE Knowledge of this Theorem is of the utmoſt Conſequence towards the Succeſs of electrical Experiments; inaſmuch as you muſt endeavour by all poſſible Means to collect the Whole of this Fire at the ſame Time. Profeſſor *Hollman* ſeems to have endeavour'd at this and ſucceeded, by having a tin Tube, in one End of which he put a great many Threads, whoſe Extremities touch'd the Sphere when in Motion, and each Thread collected a Quantity of electrical Fire, the Whole of which center'd in the tin Tube, and went off at the other Extremity. Another Thing to be obſerv'd, is to endeavour to make the Flaſhes follow each other ſo faſt, as that a Second may be viſible before the Firſt is extinguiſh'd. When you tranſmit the electrical Fire along a Sword or other Inſtrument, whoſe Point is ſharp, it often appears as a Number of diſſeminated Sparks, like wet Gunpowder or *Wild-fire*; but if the Inſtrument has no Point, you generally perceive a pure bright Flame, like what is vulgarly call'd the *Blue-ball*, which gives the Appearance of Stars to fired Rockets.

The following is the Method I made uſe of and was happy enough to ſucceed in. I ſuſpended a Power in ſilk Lines; at the Handle of which I hung ſeveral little Bundles of white

Thread, the Extremities of which were about a Foot at right Angles from the Poker. Among theſe Threads, which were all attracted by the rubbed Tube, I excited the greateſt electrical Fire I was capable, whilſt an Aſſiſtant near the End of the Poker held in his Hand a Spoon, in which were the warm Spirits. Thus the Thread communicated the Electricity to the Poker, and the Spirit was fired at the other End. It muſt be obſerv'd in this Experiment, that the Spoon with the Spirit muſt not touch the Poker; if it it does, the Electricity without any flaſhing is communicated to the Spoon, and to the Aſſiſtant in whoſe Hand it is held, and ſo is loſt in the Floor.

By theſe Means, I fired ſeveral Times not only the ætherial Liquor or Phlogiſton of *Frobenius* and rectified Spirit of Wine, but even common proof Spirit. Theſe Experiments, as I before obſerv'd, were made laſt *Fri-*

day Night, the Air being perfectly dry. *Sunday* proved wet and *Monday* ſomewhat warm, ſo that the Air was full of Vapour; Wind South-Weſt and cloudy. Under theſe Diſadvantages, on *Monday* Night I attempted again my Experiments; they ſucceeded, but with infinitely more Labour than the preceeding, becauſe of the Unfitneſs of the Evening for ſuch Trials. *Your Candour* will not permit you to think my Minuteneſs trivial, with Regard to the Circumſtances of the Weather, who know, how many Things muſt concur to make theſe Experiments ſucceed. I ſhall wait with Impatience for a proper Opportunity to have theſe Experiments repeated in your Preſence, and am, with the utmoſt Reſpect,

Sir, your moſt obedient,

Alderſgate-Street,
March 27. 1746.

humble Servant,

W. WATSON.

TO THE

ROYAL SOCIETY.

GENTLEMEN,

I LATELY acquainted you, that I had been able to fire Spirit of Wine, *Phlogiſton* of *Frobenius*, and common proof Spirit, by the Power of Electricity. Since which (till Yeſterday) we have had but one very dry fine Day; *viz.* *Monday*, *April* 15. Wind E. N. E; when about four o' Clock in the Afternoon, I got my *Apparatus* ready, and fired the Spirit of Wine four Times from the Poker as before, three Times from the Finger of a Perſon electrified, ſtanding upon a Cake of Wax, and once from the Finger of a ſecond Perſon ſtanding upon Wax, communicating with the firſt by means of a walking Cane held between their Arms extended. The horizontal Diſtance in this Caſe between the glaſs Tube and the Spirit was at leaſt ten Feet.

You all know, that there is the repulſive Power of Electricity, as well as the attractive; inaſmuch as you are able, when a Feather or ſuch-like light Subſtance is replete with Electricity, to drive it about a Room, which Way you pleaſe. This repulſive Power continues, until either the Tube loſes its excited Force, or the Feather attracts the Moiſture from the Air, or comes near to ſome non-electric Subſtance; if ſo, the Feather is attracted by, and its Electricity loſt in, whatever Non-Electric it comes near. In electrified Bodies, you ſee a perpetual Endeavour to get rid of their Electricity. This induced me to make the following Experiment. I placed a Man upon a Cake of Wax, who held in one of his Hands a Spoon with the warm Spirits, and in the other a Poker with the Thread. I rubbed the Tube amongſt the Thread, and electrified him as before. I then ordered a Perſon not electrified to bring his Finger near the Middle of the Spoon; upon which, the Flaſh from the Spoon and Spirit was violent enough to fire the Spirit. This Experiment I then repeated three Times. In this Method, the Perſon by whoſe Finger the Spirit of Wine is fired, feels the Stroke much more violent, than when the electrical Fire goes from him to the Spoon. This Method for the Sake of Diſtinction, we will call the repulſive Power of Electricity.

The late Dr. *Deſaguliers* has obſerved in his excellent Diſſertation concerning Electricity, " That there is a

“ Sort of Capriciouſneſs attending
“ theſe Experiments, or ſomething un-
“ accountable in their Phænomena,
“ not to be reduced to any Rule.
“ For ſometimes an Experiment,
“ which has been made ſeveral Times
“ ſucceſſively, will all at once fail.”
Now I imagine that the greateſt Part, if not the Whole of this Matter, depends upon the Moiſture or Dryneſs of the Air, a ſudden though ſlight Alteration in which, perhaps not ſufficient to be obvious to our Faculties, may be perceived by the very ſubtle Fire of Electricity. For

1*ſt*, I CONCEIVE, that the Air itſelf (as has been obſerved by Dr. *Deſaguliers*) is an *Electric per ſe* and of the vitreous Kind; therefore it repels the Electricity ariſing from the glaſs Tube, and diſpoſes it to electrify whatever non-electrical Bodies receive the Effluvia from the Tube.

2*dly*, THAT Water is a *non-Electric*, and of Conſequence a Conductor of Electricity; this is exemplified by a Jett of Water being attracted by the Tube, *from either Electric*'s *per ſe* conducting Electricity, and *non-Electric*'s more readily when wetted; but what is more to my preſent Purpoſe, is, that if you only blow through a dry glaſs Tube, the Moiſture from your Breath will cauſe that Tube to be a Conductor of Electricity.

THESE being premiſed; in proportion as the Air is replete with watery Vapours, the Electricity ariſing from the Tube, inſtead of being conducted as propoſed, is, by means of theſe Vapours, communicated to the circumambient Atmoſphere and diſſipated as faſt as excited.

THIS Theory has been confirmed to me by divers Experiments, but by none more remarkably than on the Evening of the Day I made thoſe before-mention'd; when the Vapours, which in the Afternoon by the Sun's Heat, and a briſk Gale were diſſipated, and the Air perfectly dry, deſcended again in great Plenty upon the Abſence of both, and the Evening was very damp. For between ſeven and eight o'Clock, I attempted again the ſame Experiments in the ſame Manner, without being able to make any of them ſucceed; though all thoſe mention'd in this Paper with others of leſs Note, were made in Half an Hour's Time.

I AM the more particular in this, being willing to ſave the Labour of thoſe, who are deſirous of making theſe Kind of Trials; for although ſome of the leſſer Experiments may ſucceed almoſt at any Time, yet I never could find that the more remarkable

able ones would ſucceed but in dry Weather.

I am, Gentlemen,

London, April 25. 1745.

Your moſt obedient,

humble Servant,

W. WATSON.

TO

TO THE

ROYAL SOCIETY.

GENTLEMEN,

IN ſome Papers I lately did myſelf the Honour to lay before you, I acquainted you of ſome Experiments in Electricity; particularly I took notice of having been able to fire Spirit of Wine by what I call'd the repulſive Power thereof; which I have not heard had been thought of by any of thoſe *German* Gentlemen, to whom the World is obliged for many ſurprizing Diſcoveries in this Part of natural Philoſophy.

How far ſtrictly ſpeaking the Spirit in this Operation may be ſaid to be fired by the repulſive Power of Electricity, or how far that Power, which repels light Subſtances when fully impregnated with Electricity, fires the Spirit, may probably be the Subject of a future Inquiry; but as I am unwilling to introduce more Terms into any Demonſtration than what are abſolutely neceſſary for the more ready Conception thereof, and as inflammable Subſtances may be fired by Electricity two different Ways, let the following Definitions at preſent ſuffice of each of theſe Methods.

But firſt give me Leave to premiſe, that no inflammable Subſtances will take fire, when brought into or near the Contact of *Electrics per ſe* excited to Electricity. This Effect muſt be produced by non-electrical Subſtances impregnated with Electricity received from the exciting *Electrics per ſe.* But to return,

1ſt, I SUPPOSE that inflammable Subſtances are fired by the attractive Power of Electricity, when this Effect ariſes from their being brought near excited non-Electrics.

2dly, THAT inflammable Subſtances are fired by the repulſive Power of Electricity; when it happens, that the inflammable Subſtances, being firſt electrified themſelves, are fired by being brought near non-Electrics not excited.

THIS Matter will be better illuſtrated by an Example. Suppoſe that either a Man ſtanding upon a Cake of Wax, or a Sword ſuſpended in ſilk Lines are electrified, and the Spirit, being brought near them, is fired, this is ſaid to be perform'd by the attractive Power of Electricity. But if the Man electrified as before holds a Spoon in his Hand containing the Spirit, or the ſame Spoon and Spirit are placed upon the Sword, and a Perſon not electrified applies his Finger near the Spoon, and the Spirit is fired from the Flame ariſing from the Spoon and Spirit upon ſuch Application; this I call being fired by the repulſive Power. Of the two mention'd Kinds I generally find the repulſive Power ſtrongeſt.

SINCE my laſt Communication, the Spirit has been fired both by the attractive and repulſive Power through four Perſons ſtanding upon electrical Cakes; each communicating with the other either by the Means of a walking Cane, a Sword, or any other non-electric Subſtance. It has likewiſe been fired from the Handle of a Sword held in the Hand of a third Perſon.

I HAVE not only fired *Frobenius*'s Phlogiſton, rectified-ſpirit and common proof-ſpirit, but alſo Sal volatile Oleoſum, Spirit of Lavender, dulcified

Spirit of Nitre, Peony Water, *Daffy*'s Elixir, *Helvetius*'s Stiptic, and ſome other Mixtures where the Spirit has been very conſiderably diluted; likewiſe diſtilled vegetable Oils, ſuch as that of Turpentine, Lemon, Orange Peels and Juniper, and even thoſe of them, which are ſpecifically heavier than Water, as Oil of Saſſafras; alſo reſinous Subſtances, ſuch as Balſam Capivi and Turpentine; all which ſend forth, when warmed, an inflammable Vapour. But expreſſed vegetable Oils, as thoſe of Olives, Linſeed, and Almonds, as well as Tallow, all whoſe Vapours are uninflammable, I have not been able yet to fire; but theſe indeed will not fire on the Application of lighted Paper. Beſides, if theſe laſt would fire with lighted Paper, unleſs their Vapours were inflammable, I can ſcarce conceive they would fire by Electricity; becauſe in firing Spirits, &c. I always perceive that the

Electricity ſnaps before it comes in Contact with their Surfaces, and therefore only fires their inflammable Vapours.

As an excited non-Electric emits almoſt all its Fire, if once touch'd by a non-Electric not excited, I was deſirous of being ſatisfy'd, whether or no the Fire emitted would not be greater or leſs in proportion to the Volume of the electrified Body. In order to this I procur'd an Iron Bar about five Feet long and near 170 Pounds in Weight; this I electrified lying on Cakes of Wax and Roſin, but obſerved the Flaſhes ariſing therefrom not more violent than thoſe from a common Poker. In making this Experiment, being willing to try the repulſive Force, it once happen'd that whilſt the Bar was at one End electrifying, a Spoon lay upon the other, and upon an Aſſiſtant's pouring ſome warm Spirit into the Spoon, the electrical Flaſh from the Spoon ſnapped and fired the firſt Drop of the Spirit, which unexpectedly fired not only the whole Jett as it was pouring, but kindled likewiſe the whole Quantity in the Pot, in which I uſually have it warm'd.

I FIND, in firing inflammable Subſtances from the Finger of a Man ſtanding upon Wax, that *cæteris paribus* the Succeſs is more conſtant, if the Man inſtead of holding the Thread (the Uſe of which I communicated in a former Paper) in his Hand, the Thread is ſuſpended at the End of an Iron Rod held in one Hand, and he touches the Spirit with one of the Fingers of the other.

IF a Man, ſtanding upon the electrical Cake with a Diſh or deep Plate of Water in one Hand, and the Iron Rod with the Thread in the other, is made electrical; and a Perſon not erectified touches any Part either of the

Plate or Water, the Flaſhes of Fire come out plentifully, and wherever you bring your Finger very near, the Water riſes up in a little Cone, from the Point of which the Fire is produced, and your Finger, though not in actual Contact, is made wet. The ſame Experiment ſucceeds through three or more People.

In firing inflammable Subſtances, the Perſon who holds the Spoon in his Hand to receive the electrical Flaſhes, when the Finger of the electrified Perſon is brought near thereto, not only feels a tingling in his Hand, but even a ſlight Pain up to his Elbow. This is moſt perceptible in dry Weather, when the Electricity is very powerful.

There is a conſiderable Difficulty in firing *Electrics per ſe*, ſuch as Turpentine, and Balſam Capivi, by the repulſive Power of Electricity; becauſe in this Caſe theſe Subſtances will not permit the Electricity to paſs through them; therefore when you would have this Experiment ſucceed, the Finger of the Perſon, who is to fire them, is to be applied as near to the Edge as poſſible of theſe Subſtances when warm'd in a Spoon, that the Flaſhes from the Spoon (for theſe Subſtances will emit none) may ſnap, where they are ſpread the thinneſt, and then fire their Effluvia. This Experiment, as well as ſeveral others, ſerves to confute that Opinion, which has prevail'd with many, that the Electricity floats only upon the Surfaces of Bodies.

If an electrical Cake is dipp'd in Water, it is thereby made a Conductor of Electricity, the Water hanging about it tranſmitting the electrical Effluvia in ſuch a manner, that a Perſon ſtanding thereon can by no means be electrified enough to attract the leaf Gold at the ſmalleſt Diſtance; though the Perſon ſtanding upon the ſame

Cake when dry, attracted a Piece of fine Thread hanging at the Diſtance of two Feet from his Finger. We muſt here obſerve that the Cake being of an unctuous Subſtance, the Water will no where lie uniformly thereon; but adhere in ſeparate Moleculæ; ſo that in this Inſtance the Electricity jumps from one Particle of Water to another, till the Whole is diſſipated.

From the Appearance of the Threads amongſt which I rub the Tube, I can frequently judge, though the Spirit may be many Feet diſtant from them, whether or no it will fire; becauſe when the Perſons ſtanding upon the Wax are made electrical enough to fire the Spirit, the Threads repel each other at their lower Parts, where they are not confin'd, to a conſiderable Diſtance, and this Diſtance is in Proportion as the Threads are made electrical.

IF two Perſons ſtand upon electrical Cakes at about a Yard's Diſtance from each other, one of which Perſons, for the Sake of Diſtinction, we will call A, the other B: If A when electrified touches B, A loſes almoſt all his Electricity at that Touch only, which is receiv'd by B and ſtopp'd by the electrical Cake; if A is immediately electrified again to the ſame Degree as before and touches B, the Snapping is leſs upon the Touch; and this Snapping, upon electrifying A, grows leſs and leſs, till B being impregnated with Electricity, though receiv'd at Intervals, the Snapping will no longer be ſenſible.

THAT Glaſs will repel and not conduct the Electricity of Glaſs, has been mention'd by others, who have treated of this Subject; but the Experiments to determine this Matter muſt be conducted with a great deal of Caution; for unleſs the glaſs Tube, intended to conduct the Electricity, be as warm as the external Air, it will ſeem to prove the contrary, unleſs in very dry Places and Seaſons. Thus, I ſometimes have brought a cold, though dry, Glaſs Tube near three Feet long into a Room, where there has been a Number of People; when upon placing the Tube upon Silk Lines, and laying ſome Leaf Silver upon a Card at one End and rubbing another Glaſs Tube at the other, the Silver has, contrary to Expectation, been thrown off as readily as from an Iron Rod. At firſt I was ſurpriz'd at this Appearance, but then conjectur'd, that it muſt ariſe from the Coldneſs of the Glaſs, condenſing the floating Vapour of the Room; in Order then to obviate this, I warm'd the Tube ſufficiently, and this Effect was no longer produced, but the Silver lay perfectly ſtill.

If a Number of Pieces of finely ſpun Glaſs cut to about an Inch in Length, little bits of fine Wire of the ſame Length of what Metal you pleaſe, and ſmall Cork Balls, are either put all together, or each by themſelves, into a dry pewter Plate, or upon a Piece of poliſh'd Metal, they make in the following Manner a very odd and ſurprizing Appearance. Let a Man, ſtanding upon electrical Cakes, hold this Plate in his Hand with the bits of Glaſs, Wire, &c. detached from each other, as much as conveniently may be; when he is electrified, let him cauſe a Perſon ſtanding upon the Ground to bring another Plate, his Hand, or any other Non-Electric, exactly over the Plate containing theſe Bodies. When his Hand, &c. is about eight Inches over them, let him bring it down gently: As it comes near, in proportion to the Strength of the Electricity, he will obſerve the bits of Glaſs firſt raiſe themſelves upright; and then, if he brings his Hand nearer, dart directly up and ſtick to it without ſnapping. The bits of Wire will fly up likewiſe, and as they come near the Hand, ſnap aloud; you feel a ſmart Stroke, and ſee the Fire ariſing from them to the Hand at every Stroke; each of theſe, as ſoon as they have diſcharged their Fire, falls down again upon the Plate. The Cork Balls alſo fly up, and ſtrike your Hand, but fall again directly. You have a conſtant Succeſſion of theſe Appearances as long as you continue to electrify the Man, in whoſe Hand the Plate is held; but if you touch any part either of the Man or Plate, the Pieces of Glaſs, which before were upon their Ends, immediately fall down.

SOME few Years ago, Sir *James Lowther* brought ſome Bladders fill'd with inflammable Air, collected from his Coal-mines, to the Royal Society. This Air flam'd upon a lighted Candle being brought near it. This Inflammability has occaſion'd many terrible Accidents. Mr. *Maud*, a worthy Member of this Society, made at that Time by Art, and ſhew'd the Society, Air exactly of the ſame Quality. I was deſirous of knowing if this Air would be kindled by electrical Flaſhes. I accordingly made ſuch Air by putting an Ounce of Filings of Iron, an Ounce of Oil of Vitriol and four Ounces of Water into a Florence Flaſk; upon which an Ebullition enſued, and the Air, which aroſe from theſe Materials, not only fill'd three Bladders, but alſo, upon the Application of the Finger of an Electrified Perſon, took Flame and burnt near the Top and out of the Neck of the Flaſk a conſiderable Time. When the Flame is almoſt out, ſhake the Flaſk and the Flame revives. You muſt with your Finger dipped in Water, moiſten the Mouth of the Flask as faſt as it is dried by the Heat within, or the Electricity will not fire it: Becauſe the Flask being an Electric *per* *ſe* will not ſnap at the Application of the Finger, without the Glaſs being firſt made non-electric by wetting. It has ſometimes happen'd, if the Finger has been applied before the inflammable Air has found a ready Exit from the Mouth of the Flask, that the Flaſh has fill'd the Flask, and gone off with an Exploſion equal to the firing of a large Piſtol, and ſometimes indeed it has burſt the Flask. The ſame Effect is produced from the Spirit of Sea Salt, as from Oil of Vitriol; but as the Acid of Sea Salt is much lighter than that of Vitriol, there is no Neceſſity to add the Water in this Experiment.

THOSE who are not much acquainted with Chemical Philoſophy, may think it very extraordinary, that from a Mixture of cold Subſtances, which both conjunctly and ſeparately are uninflammable, this very inflammable Vapour ſhould be produced. In order to ſolve this, it may not be improper to premiſe, that Iron is compounded of a Metallic as well as a ſulphurous Part. This Sulphur is ſo fix'd, that, after heating the Iron red hot, and even melting it ever ſo often, the Sulphur will not be diſengaged therefrom: But upon the Mixture of the Vitriolic Acid, and by the Heat and Ebullition which are almoſt inſtantly produced, the Metallic Part is diſſolved, and the Sulphur, which before was intimately connected therewith, being diſengaged, becomes volatile. This Heat and Ebullition continues 'till the Vitriolic Acid is perfectly ſaturated with the Metallic Part of the Iron, and the Vapour once fired continues to flame, until this Saturation being effected, no more of the Sulphur flies off.

I HAVE heretofore mentioned, how conſiderably perfectly dry Air conduces to the Succeſs of theſe Experiments; but we have been lately informed by an Extract of a Letter, that *Abbé Nolet* was of Opinion, that they would ſucceed in wet Weather, provided the Tubes were made of Glaſs, tinged blue with Zaffer. I have procured Tubes of this Sort, but, after giving them many candid Trials, I cannot think them equal to their Recommendation. I firſt tried one of them in a ſmart Shower of Rain after a dry Day, when the Drops were large, and the Spirit fired three Times in about four Minutes; the ſame Effect ſucceeded, under the ſame Circumſtances, from the white one; but after three or four Hours raining, when the Air was perfectly wet, I never could make it ſucceed. And to illuſtrate this Matter further, I have been able when the Weather has been very dry, with once rubbing my Hand down this blue Tube, and applying it to the End of an Iron Rod ſix Feet long, to throw off ſeveral Pieces of Leaf-Silver lying upon a Card at the other End of this Rod, whereas I never have been able to throw it off by any Means in very wet Weather. Beſides, I am of Opinion, that after the Electrical Fire is gone from the Tube, the Tube has no Share in the conducting of it; my Sentiments on that Head I laid before you in a former Paper: For if the Silk Lines are wetted, they diffuſe all the Electricity, and the ſame Effects happen when the Air is wet, be your Glaſs of what Colour it will. It may not be improper here to obſerve, that Zaffer, which is uſed by the Glaſs-makers and Enamellers, is made of Cobalt or Mundick calcin'd after the ſubliming the Flowers. This being reduced to a very fine Powder, and mixt with twice or thrice its own Weight of finely powdered Flints, is moiſten'd with Water and put up in Barrels, in which it ſoon runs into a hard Maſs and is call'd Zaffer.

A DRY Sponge hanging by a Packthread at the End of an electrified Sword, or from the Hand of an electrified Man, gives no Signs of being made electrical; if it is well ſoak'd in Water, wherever it is touched, you both ſee and feel the electrical Sparks. Not only ſo, but if it is ſo full of Water, that it falls from the Sponge, thoſe Drops in a dark Room, receiv'd upon your Hand, not only flaſh and ſnap, but you perceive a pricking Pain. If you hold your Hand, or any non-electrical Subſtances, very near, the Water which had ceaſed dropping when the Sponge was not electrified, drops again upon its being electrified, and the Drops fall in Proportion to the receiv'd Electricity, as though the Sponge were gently ſqueez'd between your Fingers. I was deſirous to know if I was able to electrify a Drop of cold Water, dropping from the Sponge, enough to fire the Spirit; but after many unſucceſsful Trials, I was forced to deſiſt; becauſe the cold Water dropping from the Sponge not only cool'd the Spirit too much, but alſo render'd it too weak; likewiſe, every Drop carried with it great Part of the Electricity from the Sponge. I then conſider'd, in what Manner, I could give a Tenacity to the Water, ſufficient to make the Drops hang a conſiderable Time, and this I brought about by making a Mucilage of the Seeds of Fleawort. A wet Sponge then, ſqueez'd hard and fill'd with this cold Mucilage, was held in the Hand of an electrified Man, when the Drops forced out by the Electricity, aſſiſted by the Tenacity of the Liquor, hung ſome Inches from the Sponge, and by a Drop of this I fir'd not only the Spirit of Wine, but likewiſe the inflamflammable Air before mentioned, both with and without the Exploſion. What an extraordinary Effect is this! That a Drop of cold Water (for the Seeds contribute nothing but add Conſiſtence to the Water) ſhould be the Medium of Fire and Flame.

Camphor is a vegetable Reſin, and of Conſequence an Electric *per ſe.* This Subſtance, notwithſtanding its great Inflammability, will not take fire from the Finger of a Man or any other Body electrified, though made very warm and the Vapours ariſe therefrom in great Abundance. Becauſe, neither Electric's *per ſe* excited, or electrified Bodies, exert their Force by ſnapping upon Electric's *per ſe*, though not excited. If you break Camphor ſmall and warm it in a Spoon, it is not melted by Heat like other Reſins; but if that Heat were continued it would all prove volatile. To Camphor thus warm'd, the Finger of an electrified

Man, a Sword or ſuch-like, will in ſnapping exert its Force upon the Spoon, and the circum-ambient Vapour of the Camphor will be fired thereby, and light up the whole Quantity expoſed. The ſame Experiment ſucceeds by the repulſive Power of Electricity.

A POKER thoroughly ignited put into Spirit of Wine, or into the diſtilled Oil of Vegetables, produces no Flame in either; it indeed occaſions the Vapours to ariſe from the Oil in great Abundance. But if you electrify this heated Poker, the electrical Flaſhes preſently kindle Flame in either. The Experiment is the ſame with Camphor. Theſe Experiments, as well as the following, ſufficiently evince, that the electrical Fire is truly Flame, and that extreamly ſubtil.

I HAVE made ſeveral Trials in order to fire Gunpowder alone, which I tried both warm and cold, whole and powder'd, but never could make it ſucceed ; and this ariſes in part from its Vapours not being inflammable, and in part from its not being capable of being fir'd by Flame, unleſs the Sulphur in the Compoſition is nearly in the State of Accenſion. This we ſee by putting Gunpowder into a Spoon with rectified Spirit, which, when lighted, will not fire the Powder, 'till by the Heat of the Spoon from the burning Spirit, the Sulphur is almoſt melted. Likewiſe, if you hold Gunpowder ground very fine in a Spoon over a lighted Candle, or any other Flame, as ſoon as the Spoon is hot enough to melt the Sulphur, you ſee a blue Flame, and inſtantly the Powder flaſhes off. The ſame Effects are obſerv'd in the *Pulvis fulminans*, compos'd of Nitre, Sulphur, and fixed Alkaline Salt. Beſides, when the Gunpowder is very dry and ground very fine, it (as you pleaſe to make the Experiment) is either attracted, or repell'd; ſo that in the firſt Caſe, the End of your Finger when electrified, ſhall be cover'd over with the Powder, though held at ſome Diſtance; and in the other, if you electrify the Powder, it will fly off at the Approach of any non-electrified Subſtance, and ſometimes even without it. But I can at Pleaſure fire Gunpowder, and even diſcharge a Muſket, by the Power of Electricity, when the Gunpowder has been ground with a little Camphor or with a few Drops of ſome inflammable chemical Oil. This Oil ſomewhat moiſtens the Powder, and prevents its flying away; the Gunpowder then being warm'd in a Spoon, the electrical Flaſhes fire the inflammable Vapour, which fires the Gunpowder: But the Time between the Vapour firing the Powder is ſo ſhort, that frequently they appear as the ſame and not ſucceſſive Operations, wherein the Gunpowder itſelf ſeems fired by the Electricity; and indeed the firſt Time this Experiment ſucceeded, the Flaſh was ſo ſudden and unexpected, that the Hand of my Aſſiſtant, who touch'd the Spoon with his Finger, was conſiderably ſcorch'd. So that there ſeems a fourth Ingredient neceſſary to make Gunpowder readily take Fire by Flame, and that ſuch a one, as will heighten the Inflammability of the Sulphur. In common Caſes the lighted Match or the little Portion of red hot Glaſs, which falls among the Powder, and is the Reſult of the Colliſion from the Flint and Steel, fires the Charcoal and Sulphur, and theſe the Nitre. But if to theſe three Ingredients you add a fourth, *viz.* a Vegetable chemical Oil, and gently warm this Mixture, the Oil by the Warmth mixes intimately with the Sulphur, lowers its Conſiſtence, and makes it readily take fire by Flame. In theſe Operations, notwithſtanding I always made uſe of the fineſt ſcented Oils of Orange Peel, Lemons, and ſuch like, yet upon the leaſt warming the Mixture, the rank Smell of Balſam (*i. e.* the ready Solution) of Sulphur was very obvious.

Read before the R. S.
Oct. 24. 1745.

A Continuation of the Above.

Read, *Feb.* 6. 1745.

AS Water is a non-electric, and of Conſequence a Conductor of Electricity, I had Reaſon to believe that Ice was endowed with the ſame Properties. Upon making the Experiment I found my Conjectures not without Foundation; for upon electrifying a Piece of Ice, wherever the Ice was touched by a non-electric, it flaſhed and ſnapped. A Piece of Ice alſo held in the Hand of an electrified Man, as in the beforementioned Proceſſes, fired warm Spirit, chemical vegetable Oils, Camphor, and Gunpowder prepared as before. But here great Care muſt be taken, that by the Warmth of the Hand, or of the Air in the Room, the Ice does not melt; if ſo, every Drop of Water therefrom conſiderably diminiſhes the received Electricity. In Order to obviate this, I cauſed my Aſſiſtant, while he was electrifying, to be continually wiping the Ice dry upon a Napkin hung to the Buttons of his Coat, and this being electrified as well as the Ice, prevented any Loſs of the Force of the Electricity. The Experiment will ſucceed likewiſe, if, inſtead of the Ice, you electrify the Spirit, *&c.* and bring the Ice not electrified near them. I muſt obſerve, that Ice is not ſo ready a Conductor of Electricity as Water; ſo that I very frequently have been diſappointed in endeavouring with it to fire inflammable Subſtances, when it has been readily done by a Sword or the Finger of a Man.

In the firſt Paper * I had the Honour to lay before you upon this Subject, I took Notice of my having obſerved two different Appearances of the Fire from electrified Subſtances; *viz.* thoſe large bright Flaſhes, which may be procured from any Part of electrified Bodies, by bringing a Non-Electric unexcited near them, and with which we have fired all the inflammable Subſtances mentioned in the Courſe of theſe Obſervations; and thoſe, like the firing of wet Gunpowder, which are only perceptible at the Points or Edges of excited Non-electrics. Theſe laſt alſo appear different in Colour and Form according to the Subſtances from which they proceed: For from poliſhed

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* Page 6.

Bodies, as the Point of a Sword, a Silver Probe, the Points of Sciſſors, and the Edges of the Steel-bar made Magnetical by the ingenious Dr. *Knight*, the electrical Fire appears like a Pencil of Rays, agreeing in Colour with the Fire from *Boyle*'s Phoſphorus; but from unpoliſhed Bodies, as the End of a Poker, a ruſty Nail or ſuch-like, the Rays are much more red. The Difference of Colour here, I am of Opinion, is owing rather to the different Reflection of the electrical Fire from the Surface of the Body from which it is emitted, than to any Difference in the Fire itſelf. Theſe Pencils of Rays iſſue ſucceſſively as long as the Bodies, from which they proceed, are exciting; but they are longer and more brilliant, if you bring any Non-Electric not excited near them, though it muſt not be cloſe enough to make them ſnap. If you hold your Hand at about two or three Inches Diſtance from theſe Points, you not only feel ſucceſſive Blaſts of Wind from them, but hear alſo a crackling Noiſe. Where there are ſeveral Points, you obſerve at the ſame Time ſeveral Pencils of Rays.

IT appears from Experiments, that beſides the ſeveral Properties, that Electricity is poſſeſs'd of peculiar to itſelf, it has ſome in common with Magnetiſm and Light.

PROPOSITION I.

IN common with Magnetiſm, Electricity counteracts, and in light Subſtances overcomes the Force of Gravity. Like that extraordinary Power likewiſe, it exerts its Force *in Vacuo* as powerfully as in open Air, and this Force is extended to a conſiderable Diſtance through various Subſtances of different Textures and Denſities.

COROLLARY.

GRAVITY is the general Endeavour and Tendency of Bodies towards the Center of the Earth; this is overcome by the Magnet with Regard to Iron, and by Electricity with Regard to light Subſtances both in its Attraction and Repulſion; but I have never been able to diſcern that vortical Motion, by which this Effect was ſaid to be brought about by the late Dr. *Deſaguliers* and others, having no other Conception of its Manner of acting than as Rays from a Center, which indeed is confirmed by ſeveral Experiments. One of which, very eaſy to be tried, is, that if a ſingle downy Seed of Cotton Graſs is dropped from a Man's Hand, and in its Fall comes within the Attraction of the rubbed Tube; the Down of this Seed, which before ſeemed to ſtick together, ſeparates, and forms Rays round the Center of the Seed: Or if you faſten many of theſe Seeds with Mucilage of Gum Arabic, round a Bit of Stick, the Down of them when electrified, which otherwiſe hangs from the Stick, is raiſed up, and forms a circular Appearance round the Stick. As theſe light Bodies are directed in their Motions, only by the Force impreſſed upon them, and as their Appearance is conſtantly *radiatim*, ſuch Appearance by no Means ſquares with our Idea of a Vortex. Some have imagined a Polarity alſo, when they have obſerved one end of an excited Glaſs Tube repel light Subſtances, and the other attract them. But this Deception, ariſing from the whole Length of the Tube not being excited, but only ſuch Part of it as has been rubbed; ſo that as much of the Tube as is held in the Hand, remains in an unexcited State, and permits light Subſtances to lie ſtill thereon, though forcibly repell'd at the

the other End. This attractive Power of Electricity acts not only upon Non-electrics, as Leaf-Gold, Silver, Thread, and ſuch like, but alſo upon originally Electrics, as Silk, dry Feathers, little Pieces of Glaſs and Reſin; it attracts all Bodies, that are not of the ſame Standard of Electricity, (if I may be allowed the Expreſſion) as the excited Body from which it proceeds. I have found no Body however denſe, whoſe Pores are not pervious to Electricity by a proper Management, not even Gold it.

PROPOSITION II.

IN common with Light, Electricity pervades Glaſs, but ſuffers no Refraction therefrom; I having from the moſt exact Obſervations found its Direction to be in right Lines, and that through Glaſſes of different Forms, included one within the other, and large Spaces left between each Glaſs.

COROLLARY.

THIS rectilineal Direction is obſervable only as far as the Electricity can penetrate through unexcited Originally-electrics, and thoſe perfectly dry; nor is it at all material, whether theſe Subſtances are tranſparent, as Glaſs; ſemidiaphanous, as Porcelain or thin Cakes of white Wax; or quite opake, as thick woollen Cloth, as well as woven Silk of various Colours; it is only neceſſary that they be Originally-electrics. But the Caſe is widely different with Regard to Non-electrics; wherein the Direction, given to the Electricity by the excited originally-electric, is alter'd as ſoon as it touches the Surface of a Non-electric, and is propagated with a Degree of Swiftneſs ſcarcely to be meaſured in all poſſible Directions to impregnate the whole Non-electric Maſs in Contact with it, or nearly ſo, however different in itſelf, and which muſt of Neceſſity be terminated by an originally Electric, before the Electricity exerts the leaſt Attraction, and then this Power is obſerved firſt at that Part of the Non-electric the moſt remote from the originally-electric. Thus for Example, by an excited Tube held over it, Leaf Gold will be attracted through Glaſs, Cloth, &c. held horizontally in the Hand of a Man ſtanding upon the Floor, and this Attraction is exerted to a conſiderable Diſtance. On the contrary, the rubbed Tube will not attract Leaf Gold or other light Bodies, however near, through Silver, Tin, the thinneſt Board, Paper, or any other Non-electric, held in the Manner before-mentioned. But if you rub the Paper over with Wax melted, and by that Means introduce the originally-electric therein, you obſerve the Electricity acts in right Lines, and attracts powerfully. And here I muſt beg Leave to remind you, not only of the former Corollary, but of ſome of the former Experiments alſo; by which it appears, that although, to make a Non-electric exert any Power, we muſt excite the whole Maſs thereof, yet we can excite what Part, and what only, of an originally-electric we pleaſe. Thus we obſerve, that Leaf-gold, and the Seed of Cotton-graſs, (which grows upon Boggs and is a very proper Subject for theſe Inquiries) are attracted under a Glaſs Jar made warm*, and turned Bottom upwards, upon which are placed Books and ſeveral other Non-electrics; and that the Motions of the light Bodies underneath correſpond with the Motions of the Glaſs Tube held over them, the Electricity ſeeming inſtantaneouſly to paſs through the Books and the Glaſs. But this does not happen, till the Electricity has fully impregnated the Non-electrics, which lie upon the Glaſs, which received Electricity is ſtopped by the Glaſs, and then theſe Non-electrics dart their Power directly through the upper Part of the Glaſs after the Manner of Originally-electrics. But if the thinneſt Non-electric, even the fineſt Paper, as I before mentioned, is held in the Hand

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* I have conſtantly obſerved, that the electrical Attraction through Glaſs is much more powerful, when the Glaſs is made warm, than when cold. This Effect may proceed from a two-fold Cauſe: Firſt, warm Glaſs does not condenſe the Water from the Air, which makes the Glaſs, as has been before

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before † demonſtrated, a Conductor of Electricity: ſecondly; As heat enlarges the Dimenſions of all known Bodies, and conſequently cauſes their conſtituent Parts to recede from each other, the electrical Effluvia, paſſing in ſtraight Lines, find probably a more ready Paſſage through their Pores.

† Page 13.

Hand of a Man at the ſmalleſt Diſtance over the Leaf-Gold, and the Electricity is not ſtopped, not the leaſt Power will be exerted, and the Gold will lie ſtill. I muſt here remark likewiſe, that this Law of Electricity is ſo conſtant and regular, that I have not found one Deviation from it; ſo that even the Quickſilver, ſpread thin as it uſually is at the Back of a Plate of a Looking-glaſs, will prevent the paſſing through of the electrical Attraction, unleſs ſtopped by an Originally-electric. This Penetration of the electrical Power through originally-electrics is much greater than has hitherto been imagined, and has cauſed the Want of Succeſs to great Numbers of Experiments. I have been at no ſmall Pains to determine, how far this Power can penetrate through a dry Originally-electric; and have found by repeated Trials, that either in a Cake of Wax alone, or of Wax and

Reſin mixed, when the Electricity is very powerful, it has paſſed, I ſay, in ſtraight Lines through theſe Cakes of the Thickneſs of 2 Inches and $\frac{4}{10}$; but I never could make it act through one of 2 Inches $\frac{8}{10}$, for in this it was perfectly ſtopped. So that the Cakes commonly made uſe of to ſtop the Electricity, by being too thin, ſuffer a conſiderable Quantity of the electrical Power to pervade them, and be loſt in the Floor. I make no Doubt, if the electrical Power could be more increaſed, it would penetrate much further through theſe Originally-electric Bodies.

PROPOSITION III.

ELECTRICITY, in common with Light likewiſe, when its Forces are collected and a proper Direction given thereto upon a proper Object, produces Fire and Flame.

COROLLARY.

THE Fire of Electricity (as I have before obſerved) is extremely delicate, and ſets on Fire, as far as I have yet experienced, only inflammable Vapours. Nor is this Flame at all heightned by being ſuperinduced upon an Iron Rod, red hot with coarſer culinary Fire, as in a preceeding Experiment; nor diminiſhed by being directed upon cold Water. However I was deſirous of knowing, if this Flame would be effected by a ſtill greater Degree of Cold; and in order to determine this, I made an artificial Cold; by which the Mercury, in a very nice Thermometer adjuſted to *Fahrenheit*'s Scale, was depreſſed in about 4 Minutes from 15 Degrees above the freezing Point to 30 Degrees below it, that is, the Mercury fell 45 Degrees. From this cold Mixture, when electrified, the Flaſhes were as powerful and the Stroke as ſmart as from the red hot Iron. I could have made the Cold more intenſe, but the above was ſufficient for my Purpoſe. This Experiment ſeems to indicate, that the Fire of Electricity is affected neither by the Preſence or Abſence of other Fire. For as red hot Iron, by Sir *Iſaac Newton*'s Scale of Heat, is fixed at 192 Degrees, and as the Ratio between Sir *Iſaac*'s Degrees and *Fahrenheit*'s is as 34 to 180, it neceſſarily follows, that the Difference of Heat between the hot Iron and the cold Mixture is 1040 Degrees; and nevertheleſs this vaſt Difference makes no Alteration in the Appearance of the electrical Flame. We find likewiſe, that as the Fire, ariſing from the Refraction of the Rays of Light by a *Lens*, and brought to a *Focus*, is obſerved firſt at ſome ſmall Diſtance from their Surfaces, to ſet on Fire combuſtible Subſtances; the ſame Effect, as I have before obſerv'd, is produced in like Manner by electrical Flame.

I MAY perhaps be thought too minute in ſome of the before-mentioned Particulars; but in Inquiries abſtruſe as theſe are, where we have ſo little *a priori* to direct us, the greateſt Attention muſt be had to every Circumſtance, if we are truly deſirous of inveſtigating the Laws of this ſurprizing Power. For, as has been ſaid upon another Occaſion by my ever honoured Friend MARTIN FOLKES, Eſq; our moſt worthy Preſident, "that Elec-
" tricity ſeems to furniſh an inexhau-
" ſtible Fund for Inquiry; and ſure
" Phænomena ſo various and ſo won-
" derful can ariſe only from Cauſes ve-
" ry general and extenſive, and ſuch as
" muſt have been deſigned by the Al-
" mighty Author of Nature for the
" Production of very great Effects, and
" ſuch as are of great Moment to the
" Syſtem of the Univerſe."

If theſe Obſervations receive the Countenance of this learned Society, I ſhall think myſelf ſufficiently recompenſed, and am,

Gentlemen, with the higheſt Eſteem,

your moſt Obedient

humble Servant,

W. Watson.

FINIS.